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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
PAPPAS, PETER	
ART UNIT	**PAPER NUMBER**
2671	5

DATE MAILED: 01/15/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/998,380	UNGAR, PAUL JEFFREY	
	Examiner	Art Unit	
	Peter-Anthony Pappas	2671	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on *29 November 2001*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-38* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-38* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *29 November 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

13)☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

a) ☐ The translation of the foreign language provisional application has been received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claim 23 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

3. Claim 23 recites the limitation "the reflection data" in on page 22, lines 20-21. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 1-6, 8-13 and 15-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Morgan et al. (U.S. Patent No. 6, 384, 824).

6. In regards to claim 1 Morgan et. al. teaches:

a. A multi-pass system for the bump-mapping into an environment map, wherein a reflection vector of a perturbed normal, at a given pixel position, is generated during the first pass. In the second pass at least one texel in an environment map is accessed based on a previously generated reflection vector, thus showing that said reflection vector has been loaded and maintained in memory between passes so to allow for

further processing to be accomplished of said reflection vector. From this multi-pass system bump mapping and environment mapping effects can be applied in shading on a per-pixel basis. For multiple pixels there would require the use of multiple passes through a (multi-pass) graphical pipeline and thus the creation of multiple reflection vectors tied to said multiple pixels respectively (creating a reflection image), which must be loaded into memory. See column 4, lines 20-31 and 61-62, and Fig. 4. It is noted that said memory is considered to consist of any variety of memory storage methods available to a computer system such as, but not limited too, a frame buffer and texture memory.

b. The accessing of at least one texel (environment texture sample) from an environment map based on a generated reflection vector, which is represented by an overloaded lighting equation. See column 4, lines 20-31.

c. During a second pass the texel(s), retrieved by the environmental mapper, are then outputted to a lighting block where computations (additional shading, lighting, and/or coloring operations) are performed to create a final image of the geometry data bump mapped into an environment map, in which the final image has a texture based on said texel(s) retrieved by the environment mapper. Final pixel data is then output to a frame buffer (memory), which is then sent to a display 660. See column 9, lines 19-35, column 14, lines 47-51, and Fig. 6.

7. In regards to claim 2 Morgan et. al. teaches a lightning equation used to determine a lighting color value L_c, in which the variables of said lighting equation include, but are not limited too, an ambient light color, a diffused light color, a specular

light color and an environment mapping color coefficient. See column 7, lines 21-45. The terms in the lighting equation can be set so to represent a reflection vector R. The result being the output value L_c, of the overloaded lighting equation, equals a reflection vector R. See column 7, lines 60-67, and column 8, lines 1-4. It is noted that for the loading of said reflection vectors into memory that the retrieving and storing of relevant pixel data, tied to said reflection vectors, would have to done to facilitate loading. Morgan et. al fails to explicitly state red, green and blue color data (RGB).

8. It would have been well known and obvious, at the time of the applicant's invention, to include a conventional and limited color space solely consisting of primary colors (RGB), which by design are capable of forming any other color, so to optimize any possible processing and/or storage requirements necessary to handle said color data by reducing the inclusion of possibly unneeded color data.

9. In regards to claim 3 the rationale for the rejection of claim 2 is incorporated herein. Morgan et. al. teaches a reflection vector can be represented by said lighting equation, which includes a viewing vector V representative of data at a given pixel position. See column 7, lines 12-18.

10. In regards to claim 4 Morgan et. al. teaches a reflection vector color, R_c, can be obtained via the evaluation of an overloaded lighting equation. R_c is then converted to texture coordinates, which are in turn used to look up at least one texel in an environment map. See column 8, lines 5-35.

11. In regards to claim 5 the rationale for the rejection of limitation (c) of claim 1 is incorporated herein. It is noted that texels are considered to consist of RBG color data.

12. In regards to claim 6 the rationale for the rejection of limitation (a) of claim 1 is incorporated herein.

13. In regards to claim 8 the rationale for the rejection of limitation (c) of claim 1 is incorporated herein. It is noted that a result is considered pixel data, or other relevant data, that is stored in the frame buffer 650, after processing of said respective data.

14. In regards to claim 9 the rationale for the rejection of claim 1 is incorporated herein.

15. In regards to claim 10 the rationale for the rejection of claim 1 is incorporated herein. In addition Morgan et. al. teaches that R_c, which is derived from the reflection vector, can be stored temporarily in the frame buffer. See column 9, lines 12-18, and Fig 6, specifically 650.

16. In regards to claim 11 Morgan et. al. teaches texture memory 606 used to store a bump map 622 and an environment map 652. See column 10, lines 26-33, and Fig. 6. It is noted that during the second pass retrieving and applying of environmental data is performed. Thus the expectations of the claim are still met.

17. In regards to claim 12 Morgan et. al. teaches an environment map that can be, but is not limited to, a cubic or spherical environment map. See column 8, lines 32-35.

18. In regards to claim 13 Morgan et. al. teaches that the equation used to calculate the reflection vector consists of two variables N', a perturbed normal/unnormalized vector, and V, a normal/unnormalized viewing vector at a given pixel position. See column 7, lines 45-55.

19. It would have been well known and obvious to one skilled in the art, at the time of the applicant's invention, that by utilizing an equation for finding a reflection vector, wherein said equation was dependent in part on a viewing vector, would allow for the resolving and storing in memory of said equation multiple times for multiple reflection vectors, based on the respective viewing vector used in its respective calculation. Thus, allowing for the creation of multiple reflection images corresponding to a respective viewpoint (viewing vector). In addition, with respect to a given viewing vector, any of said reflection images from a possible viewing field, consisting of possible multiple reflection images, could be chosen.

20. In regards to claim 15 it is noted that reflection data is considered one or more reflection vectors. The rationale for the rejection of claim 1 is incorporated herein. Morgan et al. teaches that the pixel operation stage 740 processes graphics data (if said graphics data has been inputted as pixels) and stores a texture map in texture memory.

21. It would have been well known and obvious to one skilled in the art, at the time of the applicant's invention, to utilize texture memory for the retrieval of relevant information such as texture/texel samples, do to the fact that the steps were first taken to store said information into memory.

22. In regards to claim 16 the rationale for the rejection of claim 5 is incorporated herein.

23. In regards to claim 17 the rationale for the rejection of claim 6 is incorporated herein.

24. In regards to claim 18 the rationale for the rejection of claim 12 is incorporated herein.

25. In regards to claim 19 the rationale for the rejection of limitation (c) of claim 1 is incorporated herein.

26. In regards to claim 20 the rationale for the rejection of claim 1 is incorporated herein.

27. In regards to claim 21 the rationale for the rejection of claim 3 is incorporated herein.

28. In regards to claim 22 the rationale for the rejection of claim 6 is incorporated herein.

29. In regards to claim 23 the rationale for the rejection of claim 12 is incorporated herein.

30. In regards to claim 24 the rationale for the rejection of limitation (c) of claim 1 is incorporated herein.

31. In regards to claim 25 the rationale for the rejection of claim 15 is incorporated herein.

32. In regards to claim 26 Morgan et. al. teaches a method, system and computer program product for bump-mapping into an environment map via multiple passes. See column 4, lines 10-12, and Fig. 8, specifically 804. Specifically Morgan et al. teaches a computer system 800 that includes one or more processors, graphics subsystem 803, main memory 808 and secondary memory 810. The secondary memory can include a storage drive 814 that reads from and/or writes to a removable storage unit 818. The

removable storage unit 818 includes a computer usable storage medium having stored therein computer software and/or data. It is noted that software and/or data is considered to include computer-readable instructions. See column 10, lines 35-67, and column 11, lines 1-33. Morgan et al. also teaches that additional passes can be used to combine the resulting image with further underlying geometry, in which case mapping of textures can be performed more then once. See column 9, lines 31-35, and Fig. 6. The rationale for the rejection of claim 15 is incorporated herein. It is noted that an environment texture map is considered a texture map.

33. In regards to claim 27 the rationale for the rejection of claim 5 is incorporated herein.

34. In regards to claim 28 the rationale for the rejection of claim 4 is incorporated herein.

35. In regards to claim 29 the rationale for the rejection of claim 12 is incorporated herein.

36. In regards to claim 30 the rationale for the rejection of claim 13 is incorporated herein.

37. In regards to claim 31 Morgan et al. teaches a computer system 800 that includes one or more processors, graphics subsystem 803,main memory 808 and secondary memory 810. The secondary memory can include a storage drive 814 that reads from and/or writes to a removable storage unit 818. The removable storage unit 818 includes a computer usable storage medium having stored therein computer software and/or data. It is noted that software and/or data is considered to include

computer-readable instructions. See column 10, lines 35-67, and column 11, lines 1-33. The rationale for the rejection of claim 1 is incorporated herein. It is noted that a reflection image consists of data consisting of at least one reflection vector.

38. In regards to claim 32 the rationale for the rejection of claim 2 is incorporated herein.

39. In regards to claim 33 the rationale for the rejection of claim 6 is incorporated herein.

40. In regards to claim 34 Morgan et al. teaches:

a. Computer programs (also called computer control logic) are stored in main memory and/or secondary memory 810. See column 11, lines 56-57. In regards to a texture map comprising reflection data (reflection vector/image) and an environment map the rationale for the rejection of claim 15 is incorporated herein.

b. In regards to a processor for implementing the computer program logic the rationale for the rejection of claim 26 is incorporated herein.

c. In regards to a graphics subsystem the rationale for the rejection of claim 26 is incorporated herein. Morgan et. al teaches computer programs, when executed, enable the processor 804 to perform the features of the present invention. See column 11, lines 61-64. It is noted that said features of the present invention are those previously disclosed such as rasterizing an object using a texture map(s) and an environment map(s).

41. In regards to claim 35 Morgan et. al. teaches the graphics processing pipeline in Fig. 6, where a texture memory block 606 is connected to the texture applicator block

630, which is in turn connected to a frame buffer 650 through a lighting block 640. A rasterizer block is shown, which encompasses the texture applicator block. Thus, coupling a rasterizer to a texture memory block (part of the rasterizer block) and frame buffer block.

42. In regards to claim 36 it noted that an environment texture sample is considered a texture sample and that an environment map, from which an environment texture sample is retrieved, is considered the same as a texture map, from which a texture sample is retrieved. The rationale for the rejection of limitation (c) of claim 1 is incorporated herein.

43. In regards to claim 37 the rationale for the rejection of claim 15 is incorporated herein.

44. In regards to claim 38 the rationale for the rejection of claim 15 is incorporated herein.

45. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Morgan et al. (U.S. Patent No. 6, 384, 824), as applied to claims 1-6, 8-13 and 15-38, in view of Ho et al. (U.S. Patent No. 6, 297, 833).

46. In regards to claim 7 Morgan et al. fails to explicitly teach loading, retrieving and applying performed during a single pass through the graphics pipeline. Ho et al. teaches a multi-stage single pass graphics accelerator pipeline, used to map irregular textures to surfaces, in which loading, retrieving and applying are accomplished through the following grouped stages, respectively: front end stage, setup and rasterizer stages, texture and combiner stages. See column 1, lines 55-58, column 2, lines 31-67, column

3, lines 1-33, column 6, lines 46-63, column 7, lines 36-58, column 8, lines 15-23, and Fig. 7.

47. It would have been obvious to one skilled in the art, at the time of the applicant's invention, to utilize a single pass graphics processing (accelerator) pipeline as an alternative to that of a of multi-pass graphics processing pipeline, because of the speed advantage gain associated with a singe pass system. With a multi-pass system the various stages of a pipeline must be able to handle data fed through, typically, more then one pass – hence, multi-pass. Therefor the design of such a system (pipeline) much be significantly more complex to compensate for such data flow. However, with a single pass system this complexity is lessened by the fact that such a requirement for supporting multiple passes is not necessary and as such requires less complexity of the system design (i.e. circuit design and layout) allowing for faster processing of data through the pipeline.

48. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Morgan et al. (U.S. Patent No. 6, 384, 824), as applied to claims 1-7, 8-13 and 15-38, in view of Voorhies et al. (U.S. Patent No. 5, 704, 024).

49. In regards to claim 14 Morgan et. al. fails to explicitly teach real time loading, retrieving and applying. Voorhies et al. teaches a method and apparatus for generating reflection vectors, without normalization, so to allow for the generation of surface reflections at real time speeds.

50. It would have been obvious to one skilled in the art, at the time of the applicant's invention, to combine the teachings of Morgan et al. and Voorhies et al. so to achieve a

beneficial result of real time surface reflection generation, thus improving the quality of said reflections, because both Morgan et al. and Voorhies et al. teach the use of umnormalized vectors, for finding reflection vectors.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Peter-Anthony Pappas whose telephone number is 703-305-8984. The examiner can normally be reached on M-F 8:15am-5:45pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Zimmerman can be reached on 703-305-9798. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-3900.

Peter-Anthony Pappas
Examiner
Art Unit 2671

PAP

MARK ZIMMERMAN
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